1035-47 Diminished Myocardial Blood Flow Response During Mental Stress Occurs in Regions With Abnormal Coronary Flow Reserve Independent of Coronary Anatomy

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The pathogenesis of mental stress-induced myocardial ischemia in patients with coronary artery disease (CAD) in incompletely understood and may be related to microvascular dysfunction and/or the extent of epicardial stenoses. In order to determine whether regional myocardial blood flow (MBF) responses to mental stress (MS) can be predicted by vasodilator vascular coronary flow reserve (CFR) or coronary anatomy, we performed dynamic positron emission tomography (PET) with N-13 ammonia in 6 patients with chronic CAD at rest, during MS, and during dipyridamole infusion (dipy). All patients had prior coronary angiography and were medically managed. Mid-ventricular transaxial PET images were analyzed for each patient (3 regions per patient, representing lateral, apical, and septal regions). CFR was defined as the ratio of dipy MBF to rest MBF, and mental stress response was defined as the ratio of MS MBF to rest MBF. Abnormal CFR was defined as CFR < 2.5. Coronary anatomy was correlated to the PET data by qualitative assessment of the angiograms.

Regions with an abnormal CFR (n = 11) had a blunted MS response compared to regions with normal CFR (n = 7) (1.2 ± 0.4 vs 2.2 ± 0.8, p = 0.006). In contrast, regions served by coronary arteries with severe stenosis (≥ 80%) (n = 6) compared to regions with < 80% stenosis (n = 12) had a lower CFR (1.5 ± 0.4 vs 2.6 ± 1.1, p = 0.02) but did not have significantly blunted MS response (1.3 ± 0.6 vs 1.9 ± 0.8, p = 0.11). Furthermore, 5 (42%) of the 12 regions with the most blunted MS response (< 2.0) occurred in regions without angiographically evident coronary stenosis.

These preliminary data indicate that diminished MBF responses to MS occur more commonly in regions with abnormal CFR, and may occur in regions without significant coronary stenosis. Further studies are needed to determine if the noninvasive measurement of CFR is predictive of mental stress-induced myocardial ischemia.

1035-48 The Myocardial Ischemic Burden in Silent and Painful Exertional Ischemia by 99mTc-Sestamibi Tomography

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To determine whether patients with painful and silent myocardial hypoperfusion during exercise testing differ in the amount of ischemic burden, we studied 300 consecutive patients (57 ± 9 yrs; 86% males) with a well-established history of ischemic heart disease and reversible hypoperfusion at exercise sestamibi SPECT. Rest and stress sestamibi defects were quantitatively assessed on polar maps. Rest and stress LV endocardial contours on the midventricular short-axis slices were automatically drawn and a ventricular dilation index (DIL) derived (DIL = Stress/Rest cavity area).

During exercise, the reversible hypoperfusion was painful in 97 (32%, PAIN) and silent in 203 (68%, SILENT) patients. Age and CAD extent were similar in the two groups. PAIN patients achieved lower workloads, exercise times and peak rate-pressure products (p < 0.01) and more frequently showed significant ST segment depression during exercise (69% vs 40%, p < 0.001) than SILENT patients. At sestamibi SPECT, the amount of reversible hypoperfusion was greater in PAIN (17 ± 10% vs 11 ± 7% in SILENT, p < 0.01), despite a comparable extent of stress hypoperfusion (22 ± 12% vs 22 ± 13%). PAIN also had higher endocardial dilation index (1.32 ± 0.32 vs 1.10 ± 0.26 in SILENT, p < 0.001). By multivariate logistic analysis, history of effort angina (p < 0.001), presence of significant ST segment depression during exercise (p < 0.001) and the extent of reversible hypoperfusion (p < 0.02) were independent predictors of painful ischemia during exercise.

This is the largest study evaluating the degree of hypoperfusion and the presence of angina during exercise stress testing in a cohort of consecutive patients with ischemic heart disease and reversible hypoperfusion. The results suggest that painful ischemia during exercise is associated with a greater ischemic burden.

1035-49 Collateral-dependent Myocardial Ischemia Subtended from an Occluded Infarct Artery is Unmasked by Dipyridamole Echocardiography and Attenuated by Success Angioplasty

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Collateral well filled myocardium subtended from an occluded infarct artery may be more vulnerable to ischemia during a vasodilator stimulation (due to steal phenomena) than during exercise testing; this phenomena may be attenuated or abolished by recanalization. To assess this hypothesis, high dose (up to 0.84 mg/kg, over 10') dipyridamole echocardiography test (DET) and bicycle exercise electrocardiography test (EET) data from 72 pts with occluded infarct single vessel disease were analyzed. Angiographically assessed intra or intercoronary collateral circulation was graded from 0 (absent) to 3 (complete filling of all distal portion). There were 37 pts with high-grade collateral flow (score ≥ 2, Group I) and 35 pts with poor or absent collateral flow (score ≤ 1, Group II). Ejection fraction was lower in Group II than in Group I pts (46.3 ± 15.0 vs 54.1 ± 10.3%, p < 0.02). Number of Q or non-Q wave MI, prevalence of rest angina or effort angina did not differ between the two groups. Induced ischemia in collateral-dependent peri/in infarct region by DET as a homozonal positivity, i.e., a new or worsening of a resting dysfunction was more frequent in Group I than in Group II pts (73 vs 46%, p < 0.01), whereas EET positivity was similar in the two groups (I = 43 vs II = 50%, p = ns). The induced ischemia in Group I pts was more pronounced with DET than with EET (73 vs 43%, p < 0.01) and did not differ in Group II pts (46 vs 50%, p = ns). Successful angioplasty was achieved in 38 pts (I = 18, II = 20, 34 with positive DEE and 29 with positive EET before angioplasty). After intervention, the positivity of both DET and EET was significantly decreased and was similar in two groups (DET: I = 1 and II = 2 patients; EET: I = 1 and II = 1 patients). *Conclusions:* In pts with occluded infarct-related artery, myocardial ischemia in homozonal region is strongly dependent on development of collateral circulation and it can be unmasked by dipyridamole vasodilator test and attenuated or abolished by a successful revascularization.

1035-50 Frequency of Provoked Coronary Arterial Spasm in 640 Consecutive Patients Undergoing Coronary Arteriography with Spasm Provocation Test of Acetylcholine

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The purpose of this study was to determine the incidence of coronary artery spasm by intracoronary injection of acetylcholine (ACh). Six hundreds and forty patients were consecutively performed with spasm provocation test of ACh. ACh was performed in incremental doses of 20, 50 and 80 μg into the right coronary artery and of 20, 50 and 100 μg into the left coronary artery. We defined spasm as positive with total or subtotal obstruction. Patients with spontaneous spasm, left main narrowing and triple-vessel disease were excluded. The result was as follows:

	R	E	R/E	Aty	AMI	OMI	HCM	DCM	Val
No (patients)	103	80	66	49	87	50	21	20	28
Spasm ≥ 90% (%)	76.7	55.0	57.6	10.2	57.5	60.0	33.3	20.0	25.0
Spasm ≥ 99% (%)	52.4	26.3	37.9	2.0	21.8	44.0	14.3	5.0	10.7

	Arrh	Cong	AVB	SSS	Post P	UAP	Other	Total
No (patients)	8	5	7	16	57	31	43	640
Spasm ≥ 90% (%)	37.5	0	14.3	18.8	64.9	60.0	23.3	52.0
Spasm ≥ 99% (%)	12.5	0	0	12.5	31.6	44.0	9.3	28.6

(R: rest angina, E: effort angina, R/E: rest and effort angina, Aty: atypical chest pain, AMI: acute myocardial infarction (< 1 M), OMI: old myocardial infarction (≥ 1 M), HCM: hypertrophic cardiomyopathy, DCM: dilated cardiomyopathy, Val: valvular heart disease, Arrh: arrhythmia, Cong: congenital heart disease, AVB: atrio ventricular block, SSS: sick sinus syndrome, Post P: post percutaneous transluminal coronary angioplasty, UAP: unstable angina)

In conclusion, there were high incidence rate of coronary arterial spasm in Japanese with ACh test. A half of the patients showed at least more than 90 percent stenosis after ACh test. Moreover, a quarter of patients might have typical spasm by intracoronary injection of ACh in Japanese.

1036 Stents: New Devices and Methodology

Wednesday, March 19, 1997, 9:00 a.m.–11:00 a.m.
Anaheim Convention Center, Hall E
Presentation Hour: 9:00 a.m.–10:00 a.m.

1036-83 Effect of Stent Design and Configuration on Collapse Resistance to External Circumferential Pressure

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Differences in design and material composition may influence the ability of